North Carolina's Natural Network

How Do We Keep It Together?

North Carolina's natural network provides

- **clean air and water.**
- **fertile farmland and forests.**
- **essential wildlife habitat.**

Nature's services keep us healthy.

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What is a Natural Network?

Nature Provides Ecosystem Services that:

- **Help collect and purify water to drink and to use.**
- **Maintain balance of the air's oxygen and carbon dioxide.**
- **Create fertile soils.**
- **Prevent erosion.**
- **Prevent flooding.**
- **Maintain climate balance.**
- **Create and pollinate our food.**

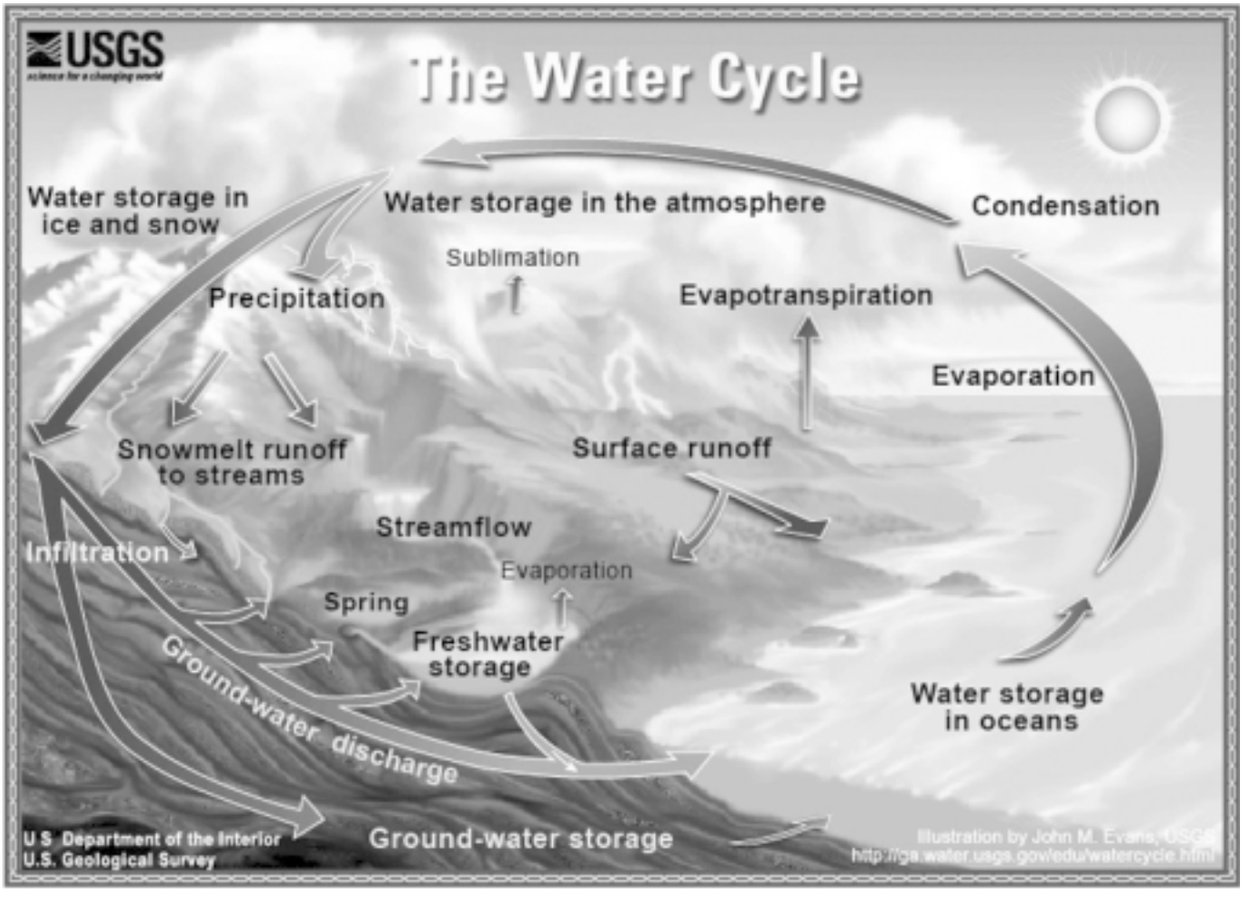
Nature Lovers

IN THE NEWS

Activities

In today's newspaper, look for articles that demonstrate Nature's Ecosystem Services at work. What were the topics of your articles? Which aspect of ecosystem services does each article address? Are your articles about the ecosystem working as it should or about events or activities that are keeping it from working properly?

The natural world has a number of systems in place that provide the basic needs to keep all living things alive. You are probably familiar with some of these environmental cycles:



Throughout the natural world, there are **ecosystems** made up of countless **organisms** - ranging from people to microscopic bacteria - that interact with each other and their **natural environment**. These natural systems work in our environment to produce many resources that people usually take for granted, even though our lives depend on them. Directly or indirectly, people depend upon the natural environment for our food, water, air and much more. The process of providing these **ecosystem services**, such as clean air and water, is so complex that humans cannot replace these functions with machines.

Links for Life

Our Natural and Human-made systems are INTERCONNECTED.

Within an ecosystem, all living things are **interdependent**. We live in the **natural environment** as active parts of the ecosystem. People have made the **built environment** so that we can live comfortably within our natural environment. We have developed ways to collect water in reservoirs and then send it through pipes to our houses - but only nature can provide rain in the first place. We can build beautiful homes and wide highways to get to them, but we can't take the carbon dioxide out of the air and turn it back into the oxygen we need to breathe. We can plant fields full of corn, beans or cotton, but we need nature to handle the pollination.

North Carolina contains one of the most diverse collections of ecosystems on the planet, with a wide range of native plants, fish and wildlife. Our state ranges from boreal forests atop the highest peak in the eastern United States to coastal peat bogs that are home to the world's only native Venus fly trap.

North Carolina's Amazing Biodiversity

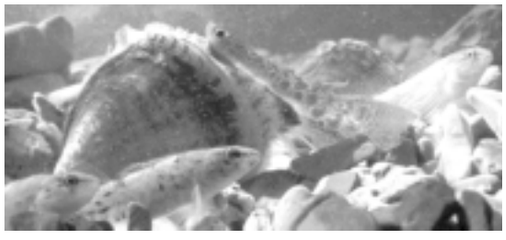
North Carolina has some of the most extraordinary natural habitats in the world:

- North Carolina is home to five eco-regions: mountains, piedmont, sandhills, coastal plain and tidewater.
- Our Sandhills region has about 2,000 different plant species, and some of the most diverse areas of vegetation in North America.

- The southern Appalachian Mountains have the largest and most diverse salamander populations on the planet - more than 50 different species!

Unfortunately, our networks of natural systems are in danger:

- Approximately 13% of native plants and 20% of native vertebrate animals are in danger of extinction.
- Only 1% of the natural areas in North Carolina's piedmont eco-region remain intact. North Carolina is down to only 2% of the original coverage by longleaf pine.



- The quality of our aquatic ecosystems is so degraded that 25% of our native species of fish, mussels and crayfish are threatened with extinction.

ACTIVITY:

Which conservation lands are located near you?

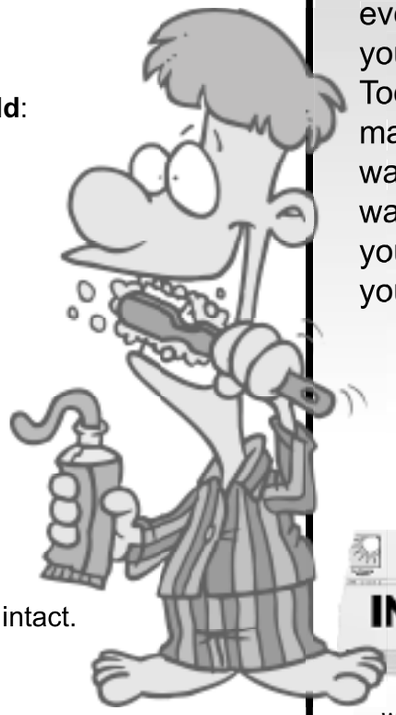
Use the Web-based Interactive Map Viewer to see which conservation lands are located near you. Go to http://www.onencnaturally.org/pages/mapviewer.html.
NOTE: Read the Map Viewer Quick Tips to get started.

1. From Choose a Region Type, select "Map a city."
2. From Choose a Target Region, select your city, and then click View Regional Map.
3. Use the built-in tools to zoom-in and explore the conserved land and water near your home.

ACTIVITY:

Ways you use clean water and air

We use eco-services everyday, but do you even notice? Today, trace how many different ways you use clean water and air as you go through your day.



Nature Lovers

IN THE NEWS

Activities

What do you know about NC's five eco-regions? In today's newspaper, find an article about each of these regions or an event occurring in each region. List one new fact you learned about each region. Can you identify any similarities between these different regions? Any differences?

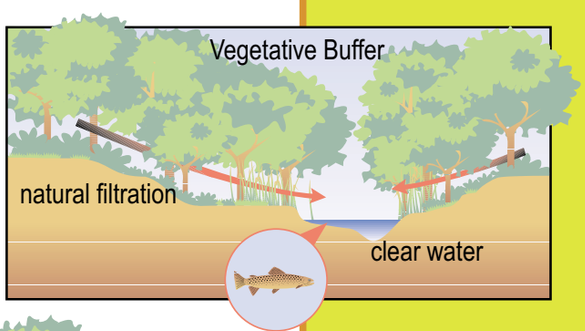
Benefits provided by nature

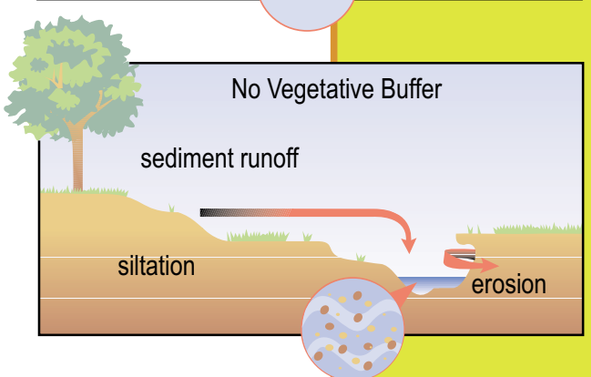
A healthy society and a healthy economy, in the long run, can only flow from A HEALTHY ENVIRONMENT.

25% of North Carolina's economy is dependent on our natural resources.

- Agriculture and forestry bring in $63 billion each year and employ 20% of North Carolina's workforce.
- Our beautiful state attracts tourists who spend more than $14 billion annually in North Carolina. More than 185,000 jobs in our state are directly supported by tourism.
- Commercial and recreational fishing industries contribute over $1 billion to North Carolina's economy.

The Effect of Plants and Trees





Places for Exercise and Recreation

Greenways provide recreational opportunities, **riparian** protection and wildlife habitat while enhancing property values and encouraging healthy lifestyles. Obesity-related illnesses have increased greatly in recent years as people have become more sedentary. Fortunately, our state has numerous local trails and greenways that make it easy to enjoy being active outdoors. Learn more at www.trianglegreenways.org.

Wildlife Corridors

Animals need room to move, forage for food, get water and mate. When we block movement and isolate a population, the species faces a greater risk of local extinction. If roads and traffic keep spreading, there will be no place left for natural populations of animals. When we preserve a riparian buffer of trees alongside streams, we provide wildlife with their natural corridor, and people can use the trails, too. Learn more at www.ncwildlife.org.

Working Farms and Forests

Sound management practices on working landscapes purify water, clean the air, and enhance wildlife habitats, thus producing benefits for all the state's residents. In addition to cleaning the air and water, North Carolina's abundant agricultural land provides us with fresh, locally grown fruits, vegetables, meat, dairy and timber. Learn more at www.oneNCnaturally.org.

Coastal Habitats

North Carolina has the largest system of estuaries and ocean waters of any state along the Atlantic coast. Intact coastal wetlands and oyster reefs clean pollutants out of the water as it flows down rivers and into the sea. Many partners are implementing North Carolina's Coastal Habitat Protection Plan to protect and restore these and other coastal fish habitats. Learn more at www.oneNCnaturally.org.

Nature will take care of us if we give it a chance.

Clean Air
Intact natural systems are able to clean our air and water, as the vegetation filters out harmful substances. Trees are especially effective at removing carbon dioxide, ozone and fine particles that make it hard for us to breathe. When the tree cover is removed and replaced with pavement, our air quality suffers, and so do we. Learn more at http://daq.state.nc.us.

Clean Water
Clean water is essential to all life. In order for fish and other aquatic life to survive, their watery home must be clear of excess nutrients, sediment and toxic chemicals. Water running over streets, parking lots and yards picks up a lot of chemicals that would not be safe to drink. Streamside vegetation slows down the flow of stormwater runoff, allowing sediment and chemicals to settle out and be removed. Learn more at http://h2o.enr.state.nc.us/.

Are Natural Areas Really Better For You?

Natural, open spaces and trees:	Parking lots, streets and roofs:
1. Filter contaminants out of stormwater runoff.	1. Carry contaminants into streams and lakes that supply drinking water.
2. Soak up water to refill underground storage.	2. Funnel rain rapidly into creeks and rivers, not underground water supplies.
3. Clean the air and produce oxygen, improving air quality.	3. Add ozone and particles to air, damaging lungs.
4. Shade the ground to keep temperatures lower.	4. Absorb sun's heat and raise air temperature.
5. Provide trails and greenways for regular exercise.	5. Make it dangerous to walk for shopping or exercise.

- One million acres of forest removes 10 million tons of carbon dioxide and produces 4 million tons of oxygen, allowing 18 million people to breathe each year.
- One acre of trees can absorb about 13 tons of dust and gases from the air every year.

ACTIVITY:
Figure It Out.

1. One acre of forest allows ___ people to breathe for one year.

2. How much money does North Carolina earn from agriculture and forestry, recreational and commercial fishing, and tourism combined?

"The physical environment, our habitat, is the most important determinant of human health. Protection of the environment and preservation of ecosystems are, in public health terms, the most fundamental steps in preventing human illness."

Physicians for Social Responsibility

Look for newspaper articles about proposed development that could affect our natural systems by reducing trees and vegetation or causing more stormwater runoff. What are the projects? Is anyone protesting the project? If so, has the developer adapted the plans to address those concerns? If so, how? If not, why do you think the problems aren't being addressed?

Nature and Human Systems

1 Choices Humans Make

Find and number each picture below.

1. Autos on busy highways make exhaust fumes.
2. Food is grown on local farms.
3. Protected coastal wetlands filter stormwater.
4. Natural areas are saved for recreation.
5. Plants and trees grow in nature park.
6. Wooded area is kept alongside stream.
7. Rain garden in yard absorbs stormwater.

Makin Conne

Matchin

Conn human on the natural on th

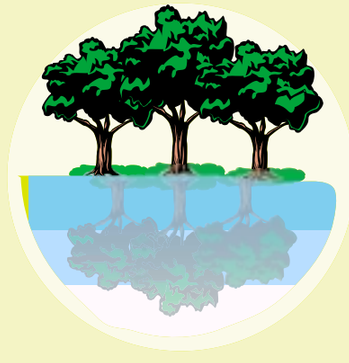
Matching activity answers: 1F; 2B; 3A; 4C; 5D; 6G; 7E

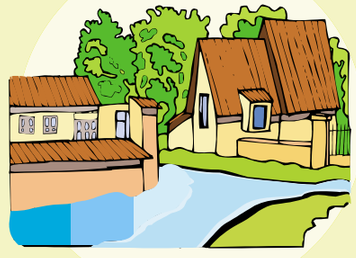
ns are INTERCONNECTED.

2 Benefits Nature Provides

Find and letter each picture below.

A. Fresh seafood is available to eat.
B. Food is sold in local stores and farmers markets.
C. People walk on greenway for exercise.
D. Wild birds and animals have a home.
E. Homes are not flooded downstream.
F. Trees absorb and clean the air.
G. Trees filter and clean the water.





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4 Scavenger Hunt

1. Find 3 ways that nature cleans up car exhaust.
2. Find 3 areas where wildlife can live.
3. Find 3 things that promote good health.

Scavenger Hunt answers:
1. Forest, row crops, trees in yard, trees in road median
2. Streamside buffer, trees in backyard, wetlands, nature park
3. Greenways, parks, produce stand, clean air, clean water, seafood

Problems and Consequences

North Carolina's population will explode from 8 million to 12 million people by 2030.

Fact

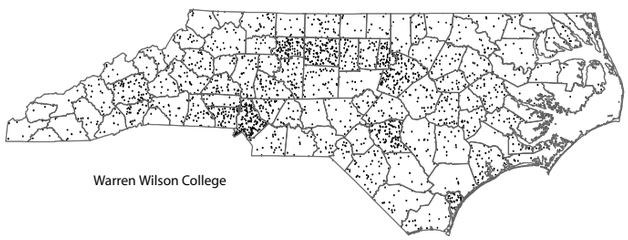
*** How large is a million acres?**

North Carolina has 100 counties, which spread across 34 million acres. One million acres is approximately the size of Orange, Durham and Wake counties combined.

Find articles in the news today that relate to urban sprawl or reduction of N.C. forestland. Where is the urban sprawl or reduction of forestland occurring? What impact do you think the area will realize due to these practices? Can you see any benefits to the development being proposed? How do you think communities balance the need for additional housing and development due to growth with the need to protect our forestlands, recreation areas, and green space?

North Carolina's population will increase by 50% in the next 25 years!

North Carolina's 1980 population: 5.8 million



North Carolina's projected 2030 population: 12.2 million

How will that affect your family?

We are rapidly losing our open space.

Fact

- North Carolina lost 1 million acres of forestland between 1990 and 2002.*
- In the last 20 years, we have lost 2.8 million acres of cropland and forestland - a rate of 383 acres every day.
- The land consumed by development increased twice as fast as the 42 percent population growth rate during that same period.
- In the last 5 years alone, the number of houses in Wake County increased by 21%.

Carrying Capacity of the Land

North Carolina has traditionally been an agricultural state, with a large portion of this fertile land covered by farms and forests. As problems developed like soil erosion and water pollution, new laws were passed and the citizens of this state changed the way they used our resources. Nature and humans maintained a good balance, so our water and air were pretty clean. With so many new residents, rural areas are being replaced by **urban sprawl**. We need to understand the effects that this rapid **urbanization** would have on our natural systems.

We tend to think that the **carrying capacity** of the land is limitless, but it is not. As the human population of an area increases, its tree population usually decreases and the amount of **impervious surface** increases. When there is less tree cover and more hardened surface, the same amount of land provides less ecosystem services. The more people who live in a given area, the greater the impact will be on the natural resources within that area.

The number of farms in our state has gone from the peak of about 300,000 in 1950 to only 50,000 in 2005.

What would happen if those farms are all turned into housing developments and shopping centers? What would be left to clean the air and filter the water and slow down the stormwater runoff? Where would we grow the food we eat, the trees we use to build homes, or the cotton used to make your jeans and t-shirts?

More people are coming, more people are coming!

ACTIVITY: Consider all the needs!

Consider all the needs that increase when we add more people -- more food, more jobs, more schools, and more space to live and move about.

1. Think about the land outside your window. Imagine what this piece of land looked like 50 years ago or even 200 years ago. Now think about what it could look like in 25 years.

2. What might life be like when there are 50% more people living here? How might the population increase affect you?

ACTIVITY:

Take turns reading with another person.

Nature Dude says - Let me break it down for you.

Are you aware that...

Nature Dude – Without enough trees, we have no clean air to breathe?
Super Cool – We would have Ozone alerts every day, man.

Nature Dude – Without green areas to filter toxins out of your water, there is no clean water to drink?
Super Cool – Even Red Bull is made of water.

Nature Dude – Without un-paved land, rain water can't soak into the ground?
Super Cool – That leaves you with an empty glass and not enough for showers either.

Nature Dude – Without Farmer Brown's farm outside town, we don't have fresh food on the table?
Super Cool – And I am kinda fond of eating, y'know.

Nature Dude – Without forests, there is no wood to build houses and furniture or to make paper?
Super Cool – So what are you planning on using in the bathroom?

Nature Dude – Without open, natural areas, there is no place for you to hike?
Super Cool – Are you ready to hike down I-40?

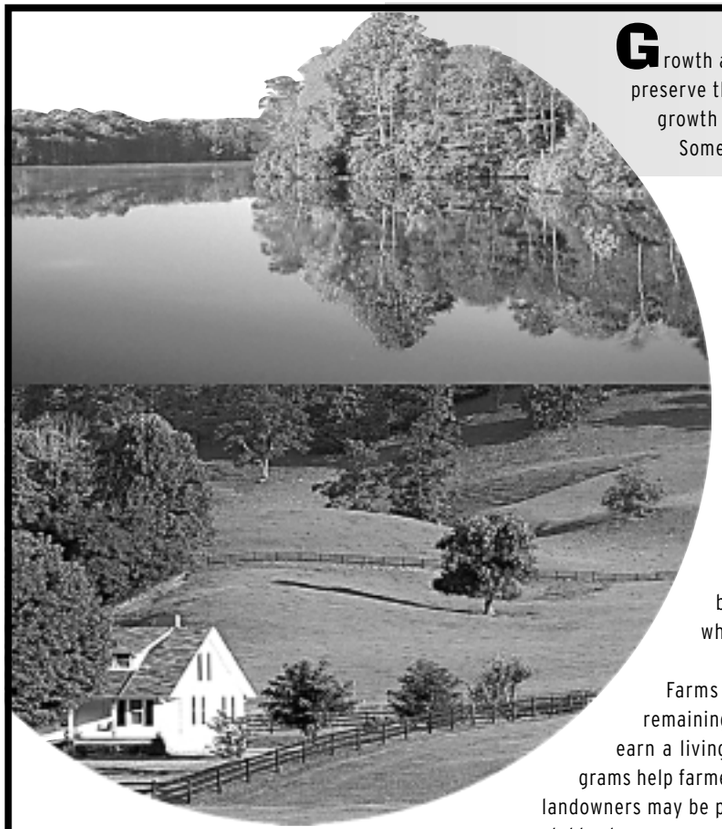
Nature Dude – Without connected territories, animals can't cross the highway to get together?
Super Cool – We are talking extinction here!

YOU are the ONE in One North Carolina Naturally!

Are you a good steward of the environment?

Can you find information in today's newspaper about a problem our area is experiencing because of population growth? What is the problem? Can you think of possible solutions to the problem? What are obstacles to the solutions?

How do we sustain the North Carolina we all love?



Growth and development will continue, so the question is how to manage the pattern of development so our state can preserve the open, green space that makes it such a great place to live. **Sustainable development** can balance this desired growth with conservation to sustain North Carolina's natural network, maintain our health, and grow a stronger economy. Some important steps toward **sustainability** have started in North Carolina.

Land Conservation

One significant step in the effort to permanently conserve natural areas is the Million Acre Initiative. In 2000, the state legislature passed a **preservation** goal of adding 1 million additional acres of natural areas before 2010. Since then, about 400,000 acres have been added toward that goal through the federal, state and local governments, and private non-profit groups. Scientists have identified the highest priority plants and animals that need to be preserved, and that information guides which land is selected for purchase.

Farms and forests cover most of North Carolina's remaining open space, but landowners must be able to earn a living from its agricultural use. Conservation programs help farmers to keep these working lands profitable. The landowners may be paid a **stewardship** incentive to practice environmental best management practices on their property or to promise not to sell their land for development. Our quality of life is improved by the better air and water quality, water supply and scenic green spaces provided by these working lands.

Many people want to live along our state's 320 miles of beaches and 4,000 miles of estuarine shoreline. The coastal ecosystem is fragile, and the species that live in these habitats are in danger. Many partners are putting into action North Carolina's Coastal Habitat Protection Plan to protect and restore our coastal fish habitats. Among the goals of the CHPP is enhancing oyster habitat **restoration** and reducing pollution caused by stormwater runoff.

Regional Open Space Planning

A **land-use plan** can be developed by elected leaders with input from local citizens. They get to decide together which areas are best suited for houses, shopping areas and roads, and where such growth would be inappropriate. Using accurate information, the community can decide how to protect important farmland, historical locations and sensitive natural areas.

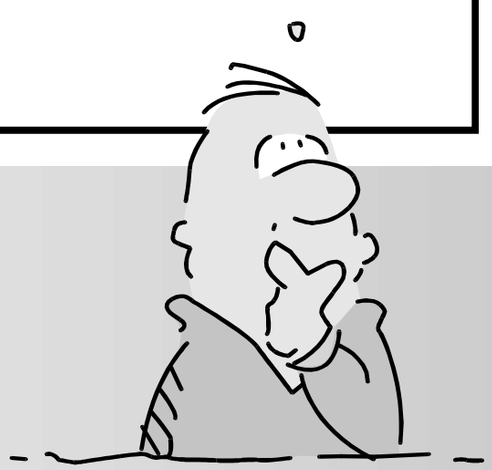
In 2004-2005, North Carolina's leading regional organizations identified local areas where they would like to focus on future conservation projects. These local community plans have been woven together into a statewide map that make it easier to see where individual green spaces and working landscapes fit and function together to form a natural network. By coordinating conservation priorities across the state, North Carolina is working in a focused way to maintain watersheds, preserve productive farmland, manage natural areas and enhance wildlife habitat for future generations.a

Community Design

It is possible to create attractive, affordable neighborhoods that protect and feature natural systems as part of their design. By preserving trees and natural vegetation that allow water to soak into the ground naturally, sites can be designed with increased open space while reducing the need for costly storm sewers. Conservation developments have a much lower impact on the natural environment and can actually save money for developers and governments.

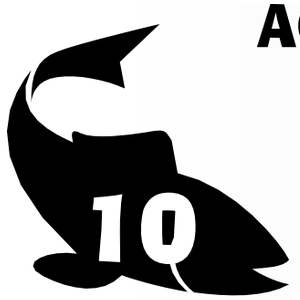
Mixed-use developments mix homes and businesses together in ways that let residents leave their car at home and walk to nearby work and shopping areas. Some Triangle mixed-use communities are Southern Village and Meadowmont in Chapel Hill and the redesigned North Hills Mall and Plaza area in Raleigh. There are at least a dozen similar projects being created around the Triangle. Local governments do not require mixed-use development, but Raleigh, Cary, Durham, Chapel Hill and other towns encourage it through planning guidelines and negotiations with developers.

We can also make better use of areas that have already been developed. Infill development uses the empty spaces that remain in existing urban and suburban locations, rather than spread built-upon land even farther into the countryside. Communities can set aside natural areas when building homes and businesses, so these urban forests provide habitat for animals in neighborhoods and parks. Homeowners can create their own backyard wildlife habitat. Landowners can set up legal conservation agreements promising to keep their and in its natural state.



ACTIVITY: How many more acres ?

1. How many more acres are needed to reach the One Million Acres goal?
2. How many acres will be needed for each of the next four years?
3. What environmental benefits are provided to all of us by working lands?



Definitions

Look for these words in BOLD TYPE on pages 2-10.

Biodiversity: all of the species and ecosystems in a region.

Built environment: man-made surroundings; something made by a human being from what were originally raw materials of nature.

Carrying capacity: maximum number of individuals the land can support without negative effects; maximum number or organisms of a given species that can survive in a given ecosystem.

Conservation: the wise and intelligent use or protection of natural resources to assure their continuing availability.

Cycle: to occur over and over again in the same order, sequence of recurring events.

Ecosystem: a complex system of plant, animal, fungal and microorganism communities and their associated non-living environment acting as an ecological unit.

Ecosystem services: the benefits that people obtain from ecosystems.

Environmental cycle: a natural process in which elements (such as nitrogen, phosphorus, carbon) are continuously cycled in various forms between different compartments of the environment (e.g., air, water, soil, organisms).

Impervious surface: hardened surfaces like roads, parking lots, driveways and sidewalks.

Interdependent: relying on one another; mutually dependent.

Land-use plan: a plan to direct the way in which development occurs, often to preserve important farmland, areas of historic value, and sensitive natural areas.

Natural environment: the surroundings of an organism, which include everything, living and non-living, that affect the organism.

Natural resources: those raw materials supplied by Earth and its processes; includes nutrients, minerals, water, plants, animals and others.

Network: an interconnected system of things or people.

Organism: any living thing, including people, animals, plants, fungi and bacteria.

Preservation: permanent conservation.

Restoration: return of an ecosystem to a close approximation of its condition prior to disturbance.

Riparian: living or growing along the banks of a river or other waterway.

Stewardship: the careful and responsible management of something entrusted to one's care; to take care of our environment responsibly; practicing wise use of resources.

Sustain: to keep going; to maintain; to supply with food.

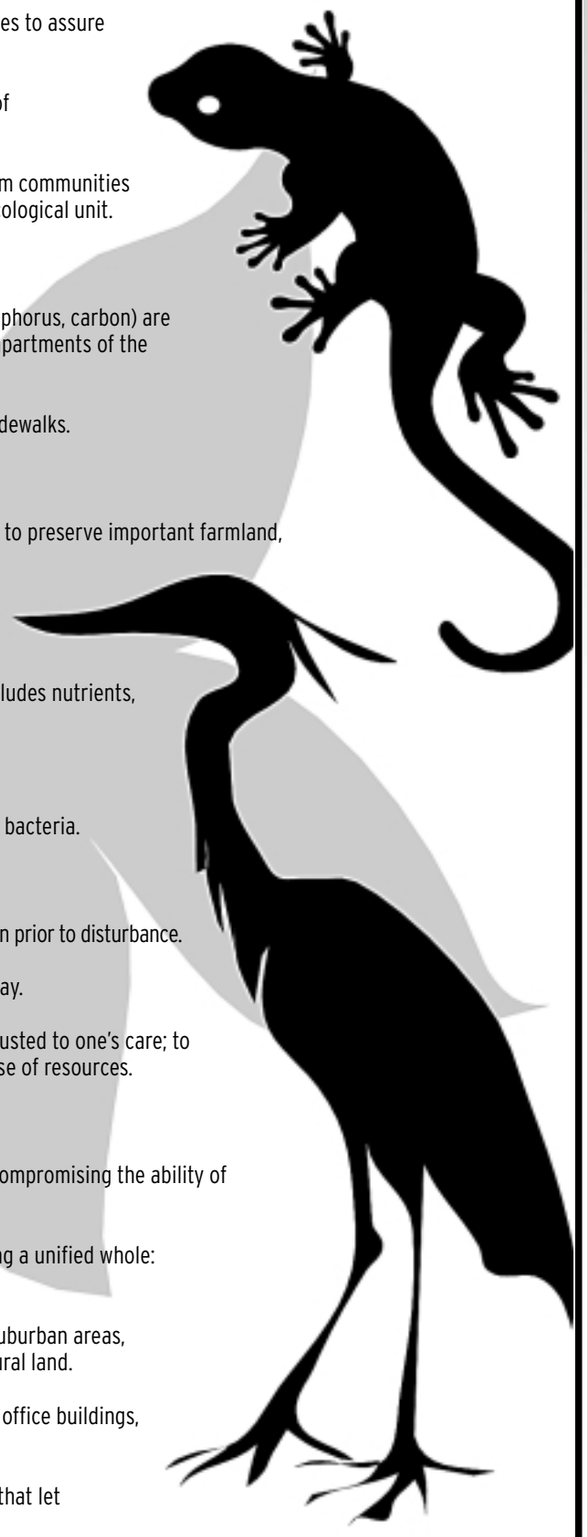
Sustainable development: development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

System: a group of independent but interrelated elements comprising a unified whole: a procedure or process for obtaining an objective.

Urbanization: process of converting rural areas and space into urban or suburban areas, often resulting in the loss of valuable wildland and agricultural land.

Urban sprawl: spreading or urban development (e.g., paved roads, houses, office buildings, and shopping centers) onto undeveloped land near a city.

Wildlife corridors: protected connections between relatively isolated habitats that let animals interact and reproduce.



Taking care of the environment is in everyone's best interest - to protect the air we breathe and the water we drink.

We want the natural environment to be able to support human needs.

Over a period of several days, look for newspaper articles about organizations or government agencies that fight to protect our environment. Make a list of those you find, describing specifically what each group does. What does your family do to protect the environment?

Which door to the future do you choose ?

Get Involved!

You can work with local leaders to:

Save natural areas as parks, trails and greenways for our families to use.

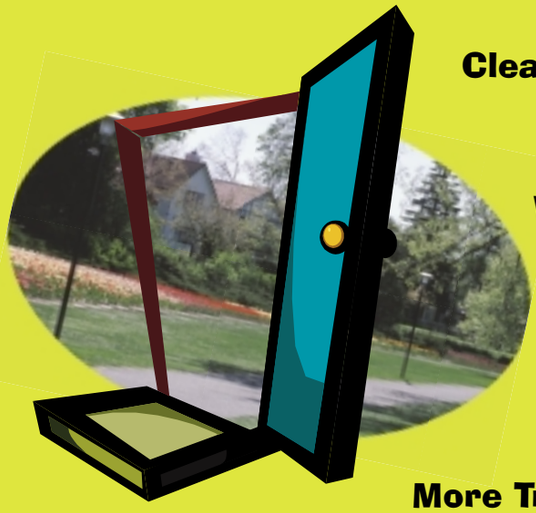
Keep natural areas intact, especially buffers along waterways, so water gets cleaned and stored.

Preserve and plant trees when building homes and shopping malls.

Plan growth so that farmland can stay on the edges of urban areas.

Keep the working farms and forests working for all of us.

Keep wildlife corridors connected, so critters can connect with each other.



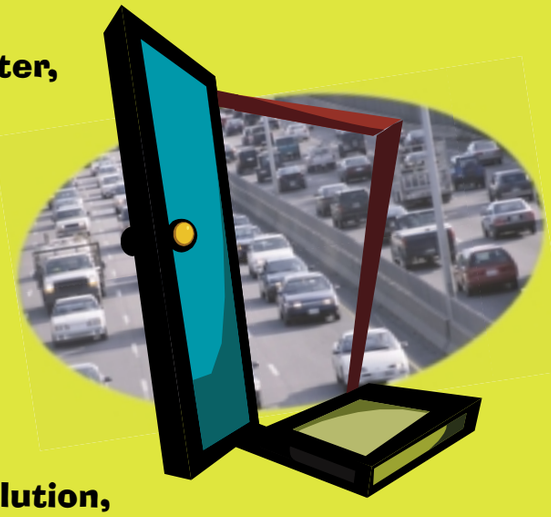
Clean Air, Clean Water,

Natural Areas,

Working Farms

and Forests

OR



More Traffic, More Pollution,

More Development, More Health Problems

Choosing Responsible Stewardship and Sustainability

All people, both as individuals and as members of society, make choices and decisions that affect the environment. We can weigh the short-term and long-term results of our actions and choose to make changes. Thinking about the world we are leaving for our children and grandchildren makes it easier to wisely use our resources now.

For more information contact: Janine Nicholson
N.C. Dept. of Environment and Natural Resources
Office of Conservation and Community Affairs
(919) 715-2700
janine.nicholson@ncmail.net

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North Carolina's Natural Network

North Carolina's landscape is changing rapidly to support more than 4 million new residents expected to live here by 2030. Growth and development will continue, so it is important to manage the pattern of development so our state can preserve the open, green space that makes it such a great place to live. Sustainable development can balance growth with conservation to sustain North Carolina's natural network, maintain our health, and grow a stronger economy.

The number of farms in our state has gone from the peak of about 300,000 in 1950 to only 50,000 in 2005.

How does losing these farms affect Nature's Life Support System? How might that directly impact you? Make a graph from the data below.

LOSS OF N.C. FARMS 1910-2005

year	# of farms	year	# of farms
1910	255,000	1960	212,000
1915	264,000	1965	175,000
1920	273,000	1970	150,000
1925	283,000	1975	105,000
1930	290,000	1980	93,000
1935	301,000	1985	76,000
1940	300,000	1990	62,000
1945	300,000	1995	59,500
1950	301,000	2000	55,500
1955	260,000	2005	50,000

Which land needs to be conserved?

- Critical natural areas, waterways and wildlife habitat can't be replaced.
- Prime agricultural land needs to be kept as working farms and forests.

Let's ask: What is the right thing for this place?

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We depend on Nature's Life Support System – *Our Links for Life!*

What are some ways that you as an individual can have a good effect on North Carolina's natural systems? Look for articles in today's newspaper that show people making a positive difference for the natural environment around them.